

REMARKS/ARGUMENTS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 5-8 and 11-16 and 22-23 are presently active in this case; Claims 5, 6, 8, 11, 12 and 14 having been amended; and Claims 22-23 added by way of the present amendment.

In the outstanding Office Action, the specification and drawings were objected to; Claims 5-8 and 11-16 were objected to for minor informalities; Claims 5-8 and 11-16 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite and Claims 5, 7, 8, 11, 12 and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Goebel et al. (U.S. Patent 6,172,391 B1, hereinafter Goebel) in view of Alsmeier et al. (U.S. Patent 6,201,730 B1, hereinafter Alsmeier) and Gruening et al. (U.S. Patent 6,093,614, hereinafter Gruening).

In response to the claim objections and the rejection under 35 U.S.C. § 112, second paragraph, Claims 5, 6, 8, 11, 12 and 14 are amended to correct the informalities noted in the outstanding Official Action. Therefore, the objection and rejection under 35 U.S.C. § 112, second paragraph, is believed to be overcome and no further objection or rejection on this basis is anticipated. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work with the Examiner in a joint effort to derive mutually satisfactory claim language.

With regard to the objection to the specification and drawings, Applicants respectfully traverse these objections. Specifically, Applicants note that the “connection line” of claim 5 is illustrated in Figs. 41 and 42 of the specification as reference number “128,” which is described on page 27, lines 18-21 of the specification. In addition, the subject matter of claim 15 is shown in Fig. 56 and described in the fifth embodiment at page 34, line 3, through page 35, line 7 of the specification. Finally, the subject matter of Claim 16 is shown in Fig.

57B and described in the sixth embodiment at page 36, line 18 through page 37, line 2 of the specification. Therefore, amendments to the drawings are not necessary and the objections to the specification and drawings are believed to be overcome by way of the above explanation.

Turning now to the merits, Applicants respectfully traverse the rejection of claim 5 under 35 U.S.C. § 103(a). Specifically, the outstanding Official Action takes the position that “a connection line LC [of Goebel et al.] is configured to bring the second impurity layer out to the major surface of the silicon substrate (col. 14, l. 14-43).”¹ The portion of Goebel et al. cited by the Official Action describes FIGS. 11A and 11b of this reference. Specifically, col. 14, lines 26-27 of Goebel et al. describe that a bit line (Blc) is buried in a substrate (1c), and a channel region (Skc) is formed on the substrate (1c). A first diffusion region (Dc1) is formed in the substrate (1c), and second source/drain region (S/D2c) is formed at a bottom portion of a groove (G2c) formed in the channel region (Skc). The bit line (Blc) and the second source/drain region (S/D2c) are connected to each other through a polysilicon feature (PL). In this regard, Applicants note that it is clear from reference to FIG. 11b that the item marked “S/D1c” should in fact be marked S/D2C” in order to correspond with Goebel et al.’s description at col. 14, lines 26-27.

Based on the above clarification, Applicants submit that “a connection line LC” of Goebel et al. does not “bring the second impurity layer (i.e., second source/drain region S/D2c) out to the surface of the substrate (corresponding to a top portion of channel region SKc)” as required by Claim 5. Therefore, Goebel et al. does not teach the present invention. Moreover, the secondary reference to Alsmeier et al. is cited for a teaching that the bit lines are commonly connected, and Gruening et al. is cited for a teaching of the square shape of the upper surface defined by the trench, and these references do not correct the deficiencies of Goebel et al. Therefore, even if Goebel et al. is combined with Alsmeier et al. or Gruening et

¹ Official Action at page 7, lines 18-19.

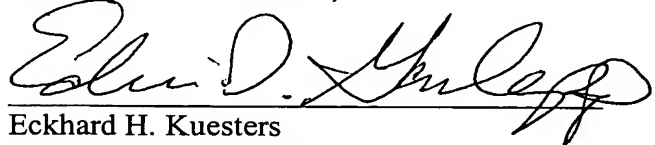
al., the present invention as claimed in Claim 5 cannot be obtained. Therefore, Claim 5 patentably defines over the cited references. As Claims 6-8 and 11-16 depend from Claim 5, these claims also patentably define over the cited references.

Finally, new independent Claims 22 and 23 have been added by way of the present amendment. Claim 22 recites "an aligning pitch of the silicon columns in an extending direction of the bit line is made loose at a site where the second impurity layer is connected to the connection line at the bottom of the trench." Claim 23 recites "the second impurity layer is united with respect to adjacent three or more of the silicon columns on the bottom of the trench." The cited references to Goebel et al., Alsmeier et al. and Gruening et al do not disclose, either alone or in combination, the above-noted limitations of Claims 22 and 23. Therefore, Claims 22 and 23 also patentably define over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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